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STATE OF THE SCIENCE

Change is never easy: How management theories can help operationalise change in medical education

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Abstract

Context: Medical education is neither simple nor stable, and is highly contextualised. Hence, ways of perceiving multiple connections and complexity are fundamental when seeking to describe, understand and address concerns and questions related to change.

Proposal: In response to calls in the literature, we introduce three examples of contemporary organisational theory which can be used to understand and operationalise change within medical education. These theories, institutional logics, paradox theory and complexity leadership theory, respectively, are relatively unknown in medical education. However, they provide a way of making sense of the complexity of change creatively. Specifically, they cross-cut different levels of analysis and allow us to 'zoom in' to micro levels, as well as to 'zoom out' and connect what is happening at the individual level (the micro level) to what happens at a wider institutional and even national or international level (the macro level), thereby providing a means of understanding the interactions among individuals, teams, organisations and systems. We highlight the potential value of these theories, provide a brief discussion of the few studies that have used them in medical education, and then briefly critique each theory.

Conclusions: We hope that by drawing the attention of readers to the potential of these management theories, we can unlock some of the complexity of change in medical education, support new ways of thinking and open new avenues for research.

1 | INTRODUCTION

Standard ways of thinking about organisational change and development suggest that change happens when policymakers, leaders and managers change the vision, structure or procedures of an organisation and then persuade others to implement their new strategy.[1,2] However, such top-down (driven by the top [management]) change efforts often fail to meet their intended purposes and instead result in disturbance, resistance to change from individuals and groups, and unintended consequences.[3] This is no different in medical education. Major changes have occurred in medical education over the last few decades and have included a shift from apprenticeship models of teaching and learning towards competency and outcomes-based medical education,[4-6] and the use of simulation training for the mastery of technical skills.[7-9] Despite these notable examples, other attempts at change have been less successful. There are plenty of examples in medical education that illustrate how the changing of different curricular ingredients, selection processes and medical school space, and the introduction of new learning tools, did not work as planned.[10-12] Nor are the actual processes of change

straightforward: attempts to reform curricula in medical education have been previously described as challenging[13] and disruptive,[14] and often manifest as an exercise that results in the repetition of sameness but no actual reform of the process.[15,16]

Why is this the case? We believe this is because medical education and training are highly complex and are characterised by multiple relationships and connections among people, contexts and systems.[17] These interconnections generate their own impacts on the wider system(s) and the system(s) in turn impacts on individuals and groups.[3] For example, the context, or prevailing environment,[18-20] is the underlying frame within which change is implemented, change occurs, and outcomes emerge.[21] Without a deep and broad understanding of these factors, we risk falling prey to solutionism, the theme of this special issue, by treating complex problems as if they have simple answers. However, what works in one place may not work in another. Individuals and teams may straddle multiple, overlapping and interconnected contexts and therefore will be influenced by, and will have influence on, these contexts.[3,22] Moreover, the outcomes, or goals, of medical education are not static: they shift on the basis of global and national societal drivers of health care, and health care and medical education,[23] a very pertinent example being the recent significant changes in the delivery of medical education in response to the global COVID-19 pandemic.[24]

The notion of complexity in medical education is not new[25-27] and mirrors thinking about health systems.[28-32] Many different theories of complexity exist and are used in multiple, not always unproblematic, ways in medical education research.[33] Moreover, although the discourse of complexity is present in medical education, it does not seem privileged in the everyday sense: undesirable or unanticipated consequences of change are often attributable to failures to acknowledge complexity and the impact of this complexity.[34-36] However, if medical education is neither simple nor stable, and is highly contextualised, ways of perceiving multiple connections and complexity are fundamental when seeking to describe, understand and address concerns and questions related to change.[14] Only by foregrounding this complexity can we create approaches to change that are both fit for purpose and future-focused.

Taking the position that complexity 'is little more than a general world view at a high level of abstraction [and] needs to be refined, adapted and applied in different ways for different research questions',[37] in this article we present several contemporary organisational theories that can be used to move beyond the metaphor to understand and operationalise change within medical education. These theories provide a way of making sense of the complexity of change creatively, without assuming that change is straightforward or controllable. By doing so, they prepare those involved with change in medical education to embrace obstacles, challenges and the unexpected, and to see these as inherent to the process of change.[38]

Furthermore, we believe there is particular value in embracing theories that cross-cut different levels of analysis and allow us to 'zoom in' to micro levels, as well as to 'zoom out' and connect what is happening at the individual level (the micro level) to what happens at a wider institutional and even national or international level (the macro level).[39] Only by doing so can we understand how macro-level understandings of change will connect to and influence interactions at the levels of the individual and the team, and conversely how individuals and teams will have agency to influence and affect at the levels of organisations and systems.[3,39] These multi-level understandings can help explain why organisational changes succeed, fail or have unintended consequences, and will help those involved in change to anticipate and manage uncertainty associated with a change process.

Key message

This paper draws attention to the potential use of management theories to unlock the complexity of change in medical education, support new ways of thinking and open new research avenues.

We acknowledge that we are not the first to apply a complexity lens to medical education.[31-33] However, in response to earlier calls in the literature to consider the greater use of organisational theory in medical education research,[40] we add to knowledge in the field by explicitly connecting theoretical perspectives from organisation studies to the complexity of change in medical education, with the ultimate aim of encouraging different ways of thinking in order to open new avenues for thought and exploration. The theories we present forthwith are those of institutional logics (IL),[41] paradox theory[42] and complexity leadership theory (CLT).[43] We chose these three theories because they all foreground the connection of everyday interaction to wider organisation- and system-level activity, particularly during times of change. The theories, what they emphasise, their potential explanatory power[44,45] and some examples of possible research questions are summarised in Table 1. Note that some of the example research questions chosen could be addressed through more than one theory in the table, an approach that, if pursued, might lead to even greater understanding of change.

It is important to acknowledge our positionality at this point. A physiotherapist by background, LG has worked in the fields of medical education and management studies since 2008. She has drawn on education and management theories, grounded in complexity, to study health care leadership, professional identities and doctors' transitions.[46,47] An occupational and clinical psychologist by background, JAC worked in the field of organisational change before moving into medical education in 2000. She has drawn on complexity and change theories when enacting various leadership roles, and has also brought management theory into her research to help understand organisational issues, including those in which there is an obvious interface between macro- and micro-level factors.[40,48]

2 | INSTITUTIONAL LOGICS

Institutional logics was introduced by Friedland and Alford,[41] who argued that attention to society-level institutional orders such as

TABLE 1 Overview: the three theories, what they emphasise, their utility and some examples of possible research questions in medical education that each theory might address

Theory	Key principles and themes	Examples of possible research questions
Institutional logics[41]	Logics are 'societal ways of ordering reality' revealed through symbols, practices, assumptions, values and beliefs Multiple logics will coexist and can complement one another or compete. At times one logic may be dominant over another and this will be revealed through interactions	Can change be facilitated by reinterpreting the IL of service and education and their relationships? Exploring how the multiple logics of professional associations are enacted within and alongside health care organisation logics at a local level Comparing the dominant logics of CBME versus local dominant logics (to reveal what aspects of the introduction and implementation of CBME may meet resistance and lead to unintended consequences) How are the logics of CBME shifted to make them contextually relevant?
Paradox theory[42]	Tensions within organisations are latent until times of change or disruption, at which point they become visible Organisational tensions cannot be resolved or circumvented but need to be managed constructively Different approaches to managing paradoxical tensions have different implications in terms of providing relief from a tension and potential for progress	How do individual and organisational levels of identity interact at times of change? How do medical schools grapple with tensions between outside and inside, new and old, and academic freedom and corporate responsibility? What tensions arise at times of curriculum reform or organisational change or restructuring, and how can these be addressed? How do different medical schools and individuals working in different medical schools respond to the same paradoxes?
Complexity leadership theory[43]	Leadership is a system phenomenon and is grounded in interconnectivity and interaction and tensions between multiple systems and levels within an organisation Three types of leadership exist: operational, entrepreneurial and enabling leadership. These leadership processes are interconnected and mutually reliant on one another	How does enabling leadership facilitate connection between operational and local levels when IPE placements are being introduced? How is innovation in learning, teaching and assessment in the workplace shared and adopted cross-organisationally? What are the consequences of a lack of enabling leadership when implementing IPE?

national culture and politics, and society-level norms was crucial to the understanding of organisational, group and individual behaviour. Logics are societal 'ways of ordering reality',[41] or expectations, norms, beliefs and rules that shape goals, behaviours and practices at an organisational, professional or individual level.[39,49] More recently, IL has been defined as 'socially constructed historical patterns of cultural symbols and material practices, including assumptions, values and beliefs by which individuals and organisations provide meaning to their daily activity, organise time and space, and reproduce their lives and experiences'.[49]

These logics, or influences, are often taken for granted and control activity through established norms.[49] For example, in Western health care, medical professional logics, traditionally embedded in expert knowledge and autonomous practice, has historically governed how health care systems have been viewed and processes of decision making enacted.[39] However, increasing demand for health care provision and reductions in the ability (or inclination) of governments to fund health care in its entirety have led to rises in both managerialism and the influence of market and corporate logics.[50,51] Table 2 provides an example summary of what some of the organisational literature perceives to be the IL at play in health care.[52,53]

Multiple logics exist in the same space (eg, managerialism versus professionalism) and vie for dominance.[49,54-56] The precise nature of the relationship between different logics is much discussed

TABLE 2 Key features of health care institutional logics (adapted from Reay et al[51] and Krystatis et al[52])

Logic	Key features
Professional	• Expert knowledge • Autonomous practice • High-quality care as established by professional bodies
Market	• 'Supply and demand' will govern what service is required and delivered • Service users will establish what high quality means
Corporate	• Managers will set systems of rules and the types of services offered (through bureaucratic means) • Targets for quality are set and imposed through managerial direction and monitoring
State	• Political priorities will shape and govern services • Targets for quality are set and imposed through legislation and senior management
Care	• Draws attention to and fosters the view that service users should be seen as a whole through community-based preventative health and social care strategies • Moves away from the medical model of the 'patient' who is treated in a hospital

and debated, but, generally speaking, different logics can coexist in the same space (logic segmenting), although the influence of these different logics on actors will vary, and they will be enacted and expanded on differentially by different actors.[54] For example, medical education is typically influenced by the logics inherent in both health care and education, which may or may not complement one another. Differences between logics and their respective influences can lead to change in logic meanings and shifts from one dominant logic to another.[57-59]

To illustrate how IL can be used as an explanatory lens, we turn to a specific example. Trish Reay and her colleagues have written extensively in the organisational literature about drawing on IL to understand change in health care organisations.[51,59,60] An example of their work involved the use of IL to explore change in a group of family physicians' collective professional role identity over time.[51] At the beginning of the study, physicians were labelled as 'autonomous experts', with the ideal logics type, professional logics, very strong, whereas state, corporate and market logics were low.

By the end of the study, physicians described their role identity as that of the head of a team, deferring responsibility for many tasks that had previously been the sole remit of physicians (for a detailed explanation of this study, please see Box S1). This study demonstrates how using an IL perspective can allow researchers to illustrate how micro-level workplace interactions effect widespread professional change.[61]

3 | APPLYING IL IN MEDICAL EDUCATION RESEARCH

Medical education research that uses IL should focus on how individuals, teams and organisations draw meaning from and enact different logics in practice, and the interplay (and potential push–pull tension) between different logics.[56] One position paper published in 2010 considered the overarching plural logics of science and care in medical education, and how different contextual factors (eg, the rise of managed care, the entry to medicine of greater numbers of women) were associated with one or other logic, and how these fluctuated over time, and created dynamic tensions about how to educate future doctors.[62] We identified only two papers using IL as a framework in empirical work, both of which were produced by the same team, who were looking specifically at how health professions education scholarship units (HPESUs) shared values and practices despite regional, national and international contextual differences.[63,64] Using interview and documentary analyses, the authors mapped out three dominant logics across HPESUs from Canada, the USA, Australia and New Zealand.[63] These were the logics of: (a) financial accountability; (b) a cohesive educational continuum, and (c) academic research, service and teaching. Although these were common logics across all HPESUs, the authors identified that different logics held different degrees of dominance in each context, reflecting wider national systems. The relative power of each logic influenced the nature of the activities (eg, the balance of time spent on service or scholarship) and outputs valued by each unit. They concluded that understandings of these logics gave insight into why individual units are structured and function in particular ways.

Looking at the wider literature, research using an IL perspective has illustrated an inherent struggle between health care managerial logics and medical logics.[39,58] In medical education, similar tensions exist between, for example, service and education provision.[65] An IL perspective may help to highlight the multiple and competing logics inherent in service and education and to foreground the underlying causes of these tensions at multiple levels.

An example of segmenting in medical education relates to the multiple logics associated with professional standards. Education standards set by professional associations, such as the UK's General Medical Council or the Australian Health Practitioner Regulation Agency, can and do compete with the logics of workplace standards that have been set by individual health care organisations. Similarly, education standards set by regulators whose remit covers medical

schools can be in tension with local university regulations relating to assessment and progression. Institutional logics could be used as a framework to explore how these logics coexist, potentially providing new perspectives on, for instance, meanings of professionalism and professional behaviours. Longitudinal work in this field might reveal the agency of individuals and groups to influence both organisational and professional logics.

4 | PARADOX THEORY

Paradox theory refers to a group of theories that focus on the conflicting but inter-related goals and competing demands within an organisation that coexist and persist over time.[66,67] Considered ubiquitous, these simultaneous, inconsistent states may be between 'innovation and efficiency, collaboration and competition, or new and old'.[68] For example, organisational change involving the creation of project teams for planning and enacting change (eg, curriculum reform) can create role ambiguity (eg, is the reform or business-as-usual the priority?). A different example, that of an employee-versus-organisation tension, would be the use of practices such as bonuses (standard in universities in some countries), which can lead to rivalry and conflict among colleagues and have adverse effects on well-being.[69] These examples illustrate how paradoxes are both inherent in systems and socially constructed as a result of different stakeholders' diverse goals and positions.[70]

The paradox perspective views tensions within organisations as latent until times of change or disruption, at which point they become visible.[70] If paradoxes are not attended to, 'ambivalence, conflict, chaos and collapse ensue'.[71] However, finding a balanced approach is key: paradoxical tensions are unresolvable by 'either … or' approaches because stressing one tension exacerbates the need for the other, perhaps providing short-term relief but ultimately raising defences and impeding the learning of new ways to work.[72] To illustrate both this and how paradox theory can be used as an explanatory lens, we turn to a specific example. Cleland et al[40] used paradox theory to explore how those working in a general surgery department in a university teaching hospital experienced, perceived and responded to service–training tensions. They found many tensions apparent in the data, with managers, surgeons and resident trainees in conflict because they held differing perspectives on the same issue of balancing service and training. This adversely impacted on relationships across and within these groups and led to individuals prioritising their own goals. Efforts to work through these tensions led to improved relationships and communication, but no new ways of working were identified and hence the balance between education and training did not shift in any real sense within the hospital structures.

Paradox theory provides a framework for considering opposing viewpoints and incompatible positions in the social context of an organisation and for raising awareness of their coexistence (ie, making latent tensions visible). The act of doing so affirms opposing tensions as equally valid and can be a means of encouraging constructive 'both … and …' responses.[66,67,73] Put simply, thinking with a paradox theory mindset allows people to confront tensions, scrutinise inherent contradictions and find creative ways to meet competing demands. Specific types of paradox operate and interact across micro, meso and macro levels, and different approaches to managing paradoxical tensions have been proposed.[74] These are performing, organising, belonging and learning, each of which has different implications in terms of providing relief from a tension and potential for progress (for more detail, see Table S1, reproduced with permission from Cleland et al[40]). Recent studies have also taken a process-based perspective to indicate how paradoxes and coping with them evolve over time and how this process is embedded in organisation structure.[75]

5 | APPLYING PARADOX THEORY IN MEDICAL EDUCATION RESEARCH

Researchers have applied a paradox theory-based lens to phenomena as varied as identity,[76] innovation,[77] governance[72] and leadership,[78] as well as part–whole tensions and systemic contradictions within organisations.[79] These are all relevant areas within medical education research. As an example of the last, consider the tensions between a medical school and its host university. The pressures on the overarching organisation may be different from those on the medical school, which is typically subject to additional external regulation. How do the actors and structures in the medical school respond to organising tensions like empowerment and control, and belonging tensions in terms of balancing being part of a collective system (the university) with the wider reference group of medical schools in their context?

Paradox theory is a particularly useful approach to the examination of change processes.[70] We referred to some common change processes in medical education earlier, but we draw here on a more general example. Universities regularly review internal structures and restructure to improve their efficiency and effectiveness, redistribute power and drive innovation. During restructuring, new goals are established, roles altered, and relationships between actors redefined.[80] Tensions occur between the old and the new goals, roles and relationships at different levels.[67,70] Paradoxes of performing arise at the micro level as individuals struggle to respond to the conflicting demands embodied within their own roles and within the roles of others with whom they share joint tasks.[66] Paradoxes of belonging occur at the meso level as different groups embody different values, beliefs and identities, shaking up group memberships and loyalties.[80] The final paradox is that of learning as restructuring is usually accompanied by new procedures and frames of reference.[79,81] Paradox theory can be used to make invisible tensions at different levels visible, to examine responses and encourage adjusting responses, and to study how a tension at one level may have effects at another level.[66,82]

Management studies indicate that context is relevant to the management of organisational paradoxes. Given this, comparative

studies could look at how medical schools and individuals working in medical schools respond to the same paradoxes (eg, shifting from the apprenticeship model of learning to competency-based medical education [CBME]), and how these responses are related to external (economic, sociocultural, legal, etc.) and internal (resources, process, values, etc.) factors.

6 | COMPLEXITY LEADERSHIP THEORY

Complexity leadership theory is a relatively new approach which regards 'leadership' as a collective process that arises from interactions among individuals, groups and contexts rather than from a discrete role allocated to an individual or an individual's capacities.[22,83,84] The focus of CLT is the 'dynamic (changing, interactive and temporal) informal interactive patterns that exist in and among organisational systems',[43] a focus that illustrates CLT's foundations in complexity theory's notion of interconnectivity. In this framework, leadership is fundamentally a system phenomenon, or the product of interactions and tensions (which can be both human and non-human) that generate learning and new outcomes.[22,43,85-87] As such, leadership (and, with it, change) can occur anywhere within a system when individuals interact over time to produce adaptive outcomes.

Uhl-Bien and colleagues propose three broad functions of leadership within a CLT perspective.[22,43] First, *operational leadership* is grounded in traditional hierarchies within an organisation, which focus on function, task, order, regulation and prescribed organisational outcomes.[43,84] An important role of operational leadership is to translate and embed ideas and innovation in the structures of the organisation.[43] Second is *entrepreneurial leadership*, which tends to operate at a local level, but also at multiple levels within organisations and systems and in interconnected ways. Entrepreneurial leadership refers to the adaptation, innovation and learning (or emergence) that occur in response to 'tensions' and new challenges.[43,84] It is often seen as informal and based on interactions rather than an act of power or authority.[43,84] Finally, *enabling leadership* works to both facilitate the emergence and adaptation that occur through entrepreneurial leadership and to manage the connections within the organisation.[43,84] In other words, enabling leadership will create an environment in which innovation and adaptation can occur whilst ensuring there is flow of new knowledge throughout an organisational structure to other systems and administrative structures.[43,84] Figure 1 gives a visual summary of these three functions.

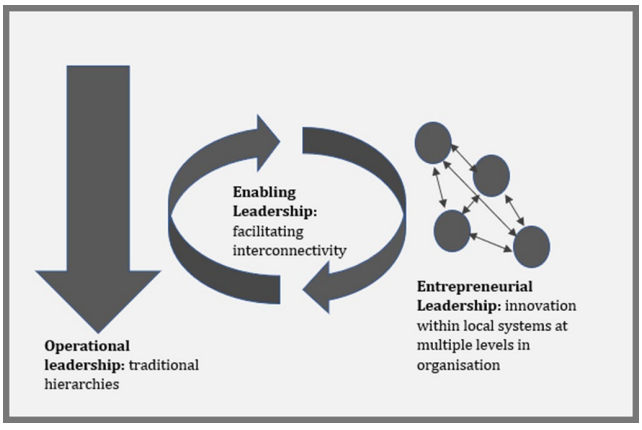

FIGURE 1 Complexity leadership theory (adapted from Uhl-Bien et al[43] and Uhl-Bien and Arena[84])

Complexity leadership theory provides a framework for the exploration of change at the micro, meso and macro levels.[84] Research using CLT could focus on the interaction between agents (eg, the intersection between operational and enabling leadership) because through this we can connect and develop understanding of the means by which change occurs at local and organisational levels.[84] It also may help us explain why change may or may not be successful. For example, CLT principles have been used to track changes in behaviours and services in public health nursing.[87] The authors argued that leadership within this system depended on several factors including: interaction and involvement of members in reflective practices; planning and decision making; the number of cross-organisation relationships of each local system; the ability to communicate change and innovation throughout an organisation, and the level of 'boundary spanning' that occurred whereby group members would link with others to build relationships and 'bridges' for the flow of information (ie, enabling leadership).

7 | APPLYING CLT IN MEDICAL EDUCATION RESEARCH

As we have previously explained, to date and to our knowledge, there are no examples of the use of CLT as an explanatory lens for the analysis of change in medical education. A contemporary example of a context in which CLT might be applied refers to exploring and explaining the processes involved in implementing interprofessional education (IPE). A shift to interprofessional practices and the corresponding obligation placed on educational institutions to implement IPE are seen as vital to the meeting of global workforce challenges, highly complex health care needs and increasingly constrained budgets.[88-90] A recent meta-synthesis exploring student, educator and service user perspectives on interprofessional placements (as part of IPE) found issues pertaining to limited understanding of learning processes, that implementation relied on individuals (and therefore introduced potential issues with sustainability), and a lack of understanding around the purpose of placements and their roles within them.[91]

By exploring the networks and connections among different levels within the system using CLT, it may be possible to identify and track how the implementation of IPE placements (achieved through operational leadership) is being adapted for suitability at a local level. These adaptations may be achieved through entrepreneurial leadership. Perhaps most importantly, and to address the concerns highlighted in this meta-synthesis, it may be pertinent to identify, track and explore the enablement of leadership by asking how enabling leadership facilitates connections among operational and local levels

with regard to the understanding of and reasoning behind IPE placements. One could also ask how enabling leadership facilitates the sustainability of innovations (rather than relying on individuals) at a local level through connections between local systems and wider organisations. Alternatively, it could be suggested through CLT that identifying a lack of presence of enabling leadership may cause disconnect between multiple levels within an organisation and ultimately cause change (in this instance the implementation of IPE placements) to fail. Locating (or not locating) enabling leadership within a medical education system and possibly developing enabling leadership capabilities within the system could be a focus for interventional study.

8 | CONSIDERING THEORY CRITICALLY

As with all theories, we must acknowledge that there will be limitations to the explanatory power of IL, paradox theory and CLT. Each theory, or group of theories, is at a different stage in its evolution. Paradox theory and related empirical work have progressed and diversified since the theory was first proposed some 35 years ago,[42] and IL has become well established in organisational studies since its inception 30 years ago.[41] However, research on CLT is in very early stages across all disciplines and more study is needed to establish the value of CLT as a critical explanatory lens for seeing leadership as an emergent 'organisational phenomenon'.[92] Reflecting this, CLT is, to the best of our knowledge, novel to medical education and medical education research. Indeed, IL and paradox theory have been used, but only in isolated studies, and further research is required to establish the use of these theories within our field.[40,63]

Additionally, IL has been critiqued for its ethnocentric nature because it was developed to explore Westernised organisations, the focus of which pertains to one way of seeing things; it is therefore essential that contexts (local and national) are considered when using this perspective.[93] Institutional logics can also be selective in nature: why choose to explore certain logics and not others and to focus on 'ideal types' of logics?[45] Researcher reflexivity is essential here in order to identify and explain what is (and what is not) explored.[94] Finally, IL has been criticised for its tautological approach (ie, the use of a multiplicity of terms that often mean the same thing); it is therefore essential that researchers maintain clarity of explanation when reporting the use of this lens of analysis.[95,96]

The strength of paradox theory is that it provides a way for considering opposing viewpoints and incompatible positions, and so can be used to make latent tensions visible. However, it does not provide a framework to assist with addressing paradox; those interesting in implementing change must look elsewhere in the literature for guidance on 'how to'. In short, recognising the paradox is not sufficient in itself to lead to change. Secondly, research has predominantly examined organisation-level approaches to the managing of paradoxical tensions: there is a need to look more closely at individual and team levels of analyses to advance paradox theory.[97] Linked to this, there is increasing interest in how some people approach competing demands with a mindset that allows them to manage complexity and be open to ambiguity, whereas others may or may not have the knowledge, capacity (eg, resources, time), social networks or mindset to seek out new and novel ways of working, and may prefer existing ways of doing things.[98,99] Further research on how collective paradoxical frames develop from the individual's frames is also called for in the literature.[97] Thirdly, paradox research is dominated by case study methodology and studies often focus on one change within an organisation. Future research using paradox theory may benefit from embracing more study designs and methodological approaches. Finally, there is also a paucity of research reporting on instances in which a paradox theory approach to tensions has negative consequences, although emerging evidence suggests that some conditions are appropriate for paradoxical leadership and mindsets, whereas others are not.[100] Other studies suggest that seeing tension as paradoxical can increase complexity and uncertainty, which may be detrimental in terms of action or commitment to a specific option.[101]

Some may argue that CLT has similarities to other leadership theories, such as those of distributed leadership and transformational leadership.[92] However, it is arguable that CLT brings opportunities to draw on more critical views of leadership which rely on a layer of emergence and construction through interaction. Thus roles (eg, who the leaders and followers are) shift away from the assumption of reasonably stable roles and lines of leadership.[92] Therefore, CLT becomes a potential tool for understanding current and possible status and why change may or may not work, rather than a frame for setting up stable systems of leadership. Critics suggest that CLT continues to rely on notions of leader-centric power to manage complexity, rather than on complexity leadership.[92] Further research using CLT (and arguably developing the theory) is essential to advance this conversation.

Finally, and more generally, the borrowing of theory from other disciplines is not new in medical education but, as with any theory borrowing, it is critical to carefully consider the theory and check that its assumptions are congruent with the specific research question.[102,103] The theories presented in this paper acknowledge the interactions between the macro and micro, or between systems and people. If this is not your area of interest, then these theories may not be appropriate. Secondly, all theory illuminates certain aspects of data: different theories will emphasise different factors and outcomes and neglect other aspects.[104]

For example, someone working from a different perspective may have considered how the sociological theories of fields and social network analysis could reconcile the micro–macro divide.[105-107] This would be perfectly valid and would add to the body of knowledge and understanding in a different way from the theories we suggest. Ultimately, theory choice, and hence what is illuminated, will be guided not just by the research question and data, but by one's own training, knowledge and interests. We urge health care professions researchers to read widely and be open to, but scholarly in terms of their critical assessment of, new theories from different fields.

9 | CONCLUSIONS

The primary aim of this paper is to introduce organisational theories that have rarely been used in medical education research but that seem to have applicability given their focus on the interconnections between people and systems, and how the system(s) in turn impacts on individuals and groups. As Finkelstein put it: 'I understand that as researchers we need to simplify very complex processes to study them carefully, but what are we left with when we remove the messiness, the back-and-forth, the reality?'[108] We hope that by drawing the attention of readers to the potential of these theories, we can unlock some of the complexity of medical education and open new avenues for research.

CONFLICTS OF INTEREST

None.

AUTHOR CONTRIBUTIONS

Both authors contributed to the conception of this work and to the drafting and subsequent revision of the paper. Both authors approved the final manuscript for submission.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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